

IN THE SPECIFICATION

Please amend the Specification by deleting the original section entitled "Brief Summary of the Invention" and replacing it with the new section presented below in marked-up form showing changes made. A separate clean copy of the replacement section follows the marked-up version.

BRIEF SUMMARY OF THE INVENTION

[0004] One embodiment ~~Embodiments~~ of the present invention ~~relates~~ relate to a method for the purification of a volatile metal hydride comprising obtaining a volatile metal hydride feed containing one or more acidic impurities, one of which is a sulfur-containing impurity; contacting the feed with an alkaline material and reacting at least a portion of the sulfur-containing impurity with the alkaline material to remove a portion of the sulfur-containing impurity from the feed and provide an intermediate purified material, wherein the contacting of the feed with an alkaline material is effected at sub-ambient temperature; and contacting the intermediate purified product with an adsorbent material to remove at least a portion of the sulfur-containing impurity from the intermediate purified material and provide a purified volatile metal hydride product.

[0005] The volatile metal hydride feed also may contain an acidic impurity which does not contain sulfur. The acidic impurities may comprise hydrogen sulfide and carbon dioxide.

[0006] The volatile metal hydride feed typically comprises one or more compounds selected from the group consisting of arsine, phosphine, and germane.

[0007] ~~Optionally, the contacting of the feed with an alkaline material may be effected at sub-ambient temperature.~~ The alkaline material may comprise one or more compounds selected from the group consisting of sodium hydroxide, potassium hydroxide, and tetraalkylammonium hydroxide.

[0008] The adsorbent material may comprise one or more adsorbents selected from the group consisting of type 4A zeolite, type 5A zeolite, type 13X zeolite, and activated alumina. The alkaline material may be an aqueous solution of one or more alkaline compounds. Optionally, the intermediate purified material may be contacted with a desiccant material prior to contacting with the adsorbent material.

[0009] Another embodiment of the invention includes a method for the purification of a volatile metal hydride comprising

(a) obtaining a volatile metal hydride feed containing one or more acidic impurities, one of which is a sulfur-containing impurity;

(b) contacting the feed with an alkaline material and reacting at least a portion of the sulfur-containing impurity with the alkaline material to remove the portion of the sulfur-containing impurity from the feed and provide an intermediate purified material; and

(c) contacting the intermediate purified material with an adsorbent material to remove at least a portion of the sulfur-containing impurity from the intermediate purified material and provide a purified volatile metal hydride product;

wherein the alkaline material is an aqueous solution of one or more alkaline compounds and wherein the alkaline material comprises one or more compounds selected from the group consisting of sodium hydroxide, potassium hydroxide, and tetraalkyl ammonium hydroxide. The intermediate purified material may be contacted with a desiccant material prior to contacting with the adsorbent material.

~~Embodiments of the invention also include a purified volatile metal hydride product made by the method comprising obtaining a volatile metal hydride feed containing one or more acidic impurities, one of which is a sulfur-containing impurity; contacting the feed with an alkaline material and reacting at least a portion of the sulfur-containing impurity with the alkaline material to remove a portion of the sulfur-containing impurity from the feed and provide an intermediate purified material; and contacting the intermediate purified product with an adsorbent material to~~

~~remove at least a portion of the sulfur-containing impurity from the intermediate-purified material and provide the purified volatile metal hydride product.~~

~~[0010] The acidic impurities may comprise hydrogen sulfide and carbon dioxide. The alkaline material may comprise one or more compounds selected from the group consisting of sodium hydroxide, potassium hydroxide, and tetraalkylammonium hydroxide. The volatile metal hydride feed typically comprises one or more compounds selected from the group consisting of arsine, phosphine, and germane.~~

~~[0011] Optionally, the contacting of the feed with an alkaline material may be effected at a sub-ambient temperature. The alkaline material may be an aqueous solution of one or more alkaline compounds. Optionally, the intermediate-purified material may be contacted with a desiccant material prior to contacting with the adsorbent material.~~

~~[0012] Another embodiment of the invention includes a system for the purification of a volatile metal hydride feed comprising~~

~~—— (a) a first vessel containing an alkaline material, wherein the vessel is adapted for contacting the volatile metal hydride feed with the alkaline material, the feed containing one or more acidic impurities, one of which is a sulfur-containing impurity, wherein at least a portion of the sulfur-containing impurity is reacted with the alkaline material to remove the portion of the sulfur-containing impurity from the feed and provide an intermediate-purified material; and~~

~~—— (b) a second vessel containing an adsorbent material, wherein the vessel is adapted for contacting the intermediate-purified product with the adsorbent material to remove at least a portion of the sulfur-containing impurity from the intermediate-purified material and provide a purified volatile metal hydride product.~~

BRIEF SUMMARY OF THE INVENTION

[0004] One embodiment of the present invention relates to a method for the purification of a volatile metal hydride comprising obtaining a volatile metal hydride feed containing one or more acidic impurities, one of which is a sulfur-containing impurity; contacting the feed with an alkaline material and reacting at least a portion of the sulfur-containing impurity with the alkaline material to remove a portion of the sulfur-containing impurity from the feed and provide an intermediate purified material, wherein the contacting of the feed with an alkaline material is effected at sub-ambient temperature; and contacting the intermediate purified product with an adsorbent material to remove at least a portion of the sulfur-containing impurity from the intermediate purified material and provide a purified volatile metal hydride product.

[0005] The volatile metal hydride feed also may contain an acidic impurity which does not contain sulfur. The acidic impurities may comprise hydrogen sulfide and carbon dioxide.

[0006] The volatile metal hydride feed typically comprises one or more compounds selected from the group consisting of arsine, phosphine, and germane.

[0007] The alkaline material may comprise one or more compounds selected from the group consisting of sodium hydroxide, potassium hydroxide, and tetraalkylammonium hydroxide.

[0008] The adsorbent material may comprise one or more adsorbents selected from the group consisting of type 4A zeolite, type 5A zeolite, type 13X zeolite, and activated alumina. The alkaline material may be an aqueous solution of one or more alkaline compounds. Optionally, the intermediate purified material may be contacted with a desiccant material prior to contacting with the adsorbent material.

[0009] Another embodiment of the invention includes a method for the purification of a volatile metal hydride comprising

(a) obtaining a volatile metal hydride feed containing one or more acidic impurities, one of which is a sulfur-containing impurity;

(b) contacting the feed with an alkaline material and reacting at least a portion of the sulfur-containing impurity with the alkaline material to remove the portion of the sulfur-containing impurity from the feed and provide an intermediate purified material; and

(c) contacting the intermediate purified material with an adsorbent material to remove at least a portion of the sulfur-containing impurity from the intermediate purified material and provide a purified volatile metal hydride product;

wherein the alkaline material is an aqueous solution of one or more alkaline compounds and wherein the alkaline material comprises one or more compounds selected from the group consisting of sodium hydroxide, potassium hydroxide, and tetraalkyl ammonium hydroxide. The intermediate purified material may be contacted with a desiccant material prior to contacting with the adsorbent material.